

Predator Reduction Using Fish Traps with Bait Attraction

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Summary

The Tracy Fish Collection Facility (TFCF) is located at the head of the Delta-Mendota Canal upstream of the Tracy Pumping Plant (C.W. Bill Jones). Fish from the San Joaquin Delta are salvaged at the TFCF before they reach the pumping plant and then released into the Sacramento River. Piscivorous fish such as striped bass (*Morone saxatilis*) reside within all major components the TFCF (Liston *et al.* 1994). As a result of predation, piscivores likely have significant impacts on fish survival and salvage efficiency for many listed species, including but not limited to, delta smelt (*Hypomesus transpacificus*), Chinook salmon (*Oncorhynchus tshawytscha*), and steelhead (*O. mykiss*). The 2009 Biological Opinion requires the TFCF to “complete studies to determine methods for removal of predators in the primary channel . . .” by December 31, 2011 (NMFS 2009). The proposed study will assist the TFCF in completing this requirement by evaluating the effectiveness of incorporating commonly used fish baits and collection traps to remove predators from the TFCF.

Fish traps are a common, passive fish capture device used as a means of collecting fish for both commercial and scientific use (Murphy and Willis 1996). Typically, localized hydraulic conditions guide fish into the trap. Once captured, trap designs permit fish survival while simultaneously making it difficult for fish to escape, permitting safe and easy capture and relocation/release.

This study proposes using existing fish trap designs and common fish baits as a new technique for removing predators from the TFCF. Most predators use a keen sense of smell, among other senses, to help find prey (Karas 2000). Many types of bait on the market expose predators to smell by adding pheromones and other odor releasing substances as the main attraction. These smelly baits could be used to lure predators from the primary channel into a fish trap at the TFCF. Once in the trap the fish can easily be removed from the primary and relocated. This is a practical concept that can easily be investigated without excessive testing or equipment design and development.

Problem Statement

Predation is among the greatest challenges for fish salvage at the TFCF (Liston *et al.* 1994). Removing predators in the primary channel is particularly challenging due to its large volume of water, flow conditions, and large number of predators. Anecdotal evidence suggests that predators such as striped bass pass through the trashracks as smaller fish and then grow as they feed within the primary channel. Many of these predators likely become resident fish as their size prevents them from returning upstream through the 2-in-wide spaces in the TFCF trashracks. It is likely that the large number of predators in the primary channel creates a competitive environment for food, and the likelihood for salvage of other fish species entering the facility is greatly decreased. While the predator's demand for food is a significant drawback for fish salvage, it may be used advantageously to remove resident predators by baiting them into a fish trap using odor releasing baits.

Goals and Hypotheses

Goal:

1. Laboratory tests will determine the effectiveness of fish baits to attract predators into a fish trap.

Hypothesis:

1. Predators are attracted into a fish trap using common fish baits at a greater rate compared to traps without any bait.

Materials and Methods

Initial testing for attraction methods will be done in Reclamation's Hydraulics Laboratory in Denver, Colorado. Striped bass will be tested in similar controlled conditions which include time since last feeding, hydraulics in test flume, and fish trap design (standard design used in other Reclamation facilities). Laboratory tests will only vary in which various brands of fish baits are evaluated on their ability to lure fish into the fish trap. Different baits, using olfactory and visual stimulus, will be compared against a control group which will experience the same testing procedure without bait in the trap. These simple laboratory tests will be used to determine the effectiveness of using this concept in an application to capture and remove predators.

In FY 2013 the most successful baits from laboratory testing will be used for field tests. Baits will be placed in the same fish traps used in the laboratory and will be deployed in the primary channel at the TFCF. Onsite demonstration testing will indicate if results from laboratory testing are verified in the field and determine if the fish trap concept is effective at the TFCF. A simple hoist system such as a portable winch or hand-lift crane will be used to lift the trap out of the channel to check for captured predators. The trap will be checked on a regular time schedule to determine the number of predators removed from the facility. Depending on test results, a more permanent hoist system could be constructed for future use. Components from the mitten crab screen, particularly the winch and cable system, might be used as the crab screen equipment is no longer used in the secondary channel.

Coordination and Collaboration

The study will be coordinated between the Technical Service Center, Mid-Pacific Region, and TFCF staffs and the interagency Tracy Technical Advisory Team through regular updates and meetings.

Endangered Species Issues

Permitting may be required for FY 2013 field testing.

Dissemination of Results (Deliverables and Outcomes)

This study will produce a Tracy Technical Bulletin that summarizes observations and results from laboratory testing submitted September 30, 2012. These results will include the types of fish baits that were tested and their ability to attract fish into a trap. Recommendations of the importance of continuing testing in the field will also be provided.

Literature Cited

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